Rainbow Hydroelectric Facility,
Powder Magazine
About 475 feet northeast of Powerhouse
Great Falls Vicinity
Cascade County
Montana

HAER NO. MT-95-N

PHOTOGRAPHS
WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
Intermountain Support Office - Denver
National Park Service
P.O. Box 25287
Denver, Colorado 80225-0287

HISTORIC AMERICAN ENGINEERING RECORD

RAINBOW HYDROELECTRIC FACILITY, POWDER MAGAZINE

I. INTRODUCTION HAER No. MT-95-N

Location:	The powder magazine is about 475 feet northeast of the northwest corner of the Rainbow Powerhouse.
Quad:	Great Falls Northeast, MT (1991)
UTM:	Zone 12; 485395 Easting; 5265215; Northing (NAD 83)
Date of Construction:	ca. 1909
Present Owner:	Pennsylvania Power and Light-Montana (PPL-Montana) 45 Basin Creek Rd., Butte, Montana
Present Use:	Abandoned
Significance:	The Rainbow Hydroelectric Facility is one of several discontinuous units comprising the Great Falls Hydroelectric Facilities Historic District. The powder magazine contributes to the significance of the district. It is reflective of the trend by late nineteenth/early twentieth century utility company's to incorporate some facilities utilized during construction of a hydroelectric plant into operation and/or maintenance activities following the plant's completion. The powder magazine is the sole construction camp facility remaining at Rainbow today (2009). Additionally, the powder magazine is a rare example of an industrial dugout.
Historian:	Renewable Technologies, Inc. 8 W. Park, Suite 313 Butte, Montana 59701 September 2009

II. HISTORICAL DATA

The powder magazine dates to the Rainbow Hydroelectric Facility's original, 1908-1910 construction phase. It probably was built shortly before work to erect the powerhouse commenced in the fall of 1909. Construction contractors reportedly stored dynamite at the powder magazine which saw use in excavating the powerhouse foundation, pressure chamber and tailrace. The powder magazine was one of the few construction facilities left standing after the Rainbow plant came on line for the first time in the summer of 1910. The power company likely continued to stock the powder magazine with dynamite for many years thereafter.[1] Major projects requiring the use of the explosive, for example, may have been the construction of the powerhouse addition and the second flowline from the intake to that addition in 1915-1917.

Probably by the 1940s or 1950s, the last of the dynamite was removed from the powder magazine. The structure subsequently became an ad hoc storage facility for core drills from project construction and other miscellaneous items later described as "junk." At some unknown time during the magazine use for junk storage, a concrete floor was added.[2]

In 1975-1978, the powder magazine was converted into a root cellar by Don Periman, a power company electrician and new resident at the Rainbow Operators' Camp. At that time, Periman cleaned out the structure, replaced the door, patched the concrete floor and added a shelf or two. He used the root cellar for about ten years, storing the vegetables that he raised at Rainbow there. After Periman left Rainbow, the old powder magazine never was used for food or material storage again.[3] It remains abandoned at present (May 2009).

III. DESCRIPTIVE DATA

The powder magazine is a dugout excavated into the base of a tall northeast facing slope about 400' north-northeast (downstream) of the Rainbow Powerhouse (Figure 1). Here it overlooks the overflow channel for the hydroelectric plant's pressure chamber. The powder magazine has the appearance of a grassy, semi-circular shaped mound fronted by a wooden wall. Maximum exterior dimensions are about 38' long at base of the front (northeast) elevation and about 22' wide (southwest-northeast) at the top of the mound. A thick layer of sod covers the mound.

The powder magazine's wooden front wall is constructed of 8" square timbers, stacked horizontally one on top of the other. There is a "gable end wall" on top of that main wall. It is

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[1] William O'Keefe, telephone interviews with Fredric L. Quivik, 20 November 1987, 17 February 1988. At the time of these interviews O'Keefe was the assistant superintendent of operations at the Rainbow Hydroelectric Facility, while Quivik worked as an historian for Renewable Technologies, Inc. Don Periman, telephone interview with Mitzi Rossillon, June 2009, cited in: Mitzi Rossillion, *Rainbow Redevelopment Powderhouse Archeological Testing, Cascade County, Montana* (Butte: Renewable Technologies, Inc., 2009), 3-4.

[2] Periman interview with Rossillon, June 2009.

[3] Ibid.

No.	Name / Function	Construction	Status
3	Flowline & Pressure Chamber	1909-10	Contributing
7	Powerhouse	1909-10; 1917	Contributing
20	Powder Magazine	ca. 1909	Contributing
21	Clubhouse	1925	Removed
22	Residence	1911	Removed
23	Residence	1913	Removed
24	Garage	1933	Removed
30	Swimming Pool	ca. 1925	Removed
35	Railroad Grade	1908	Contributing
36	Terraced Gardens	ca. 1920s / 1930s	Contributing
39	Stone Culvert	ca. 1925	Contributing
40	Plank Bridge	ca. 1925	Contributing

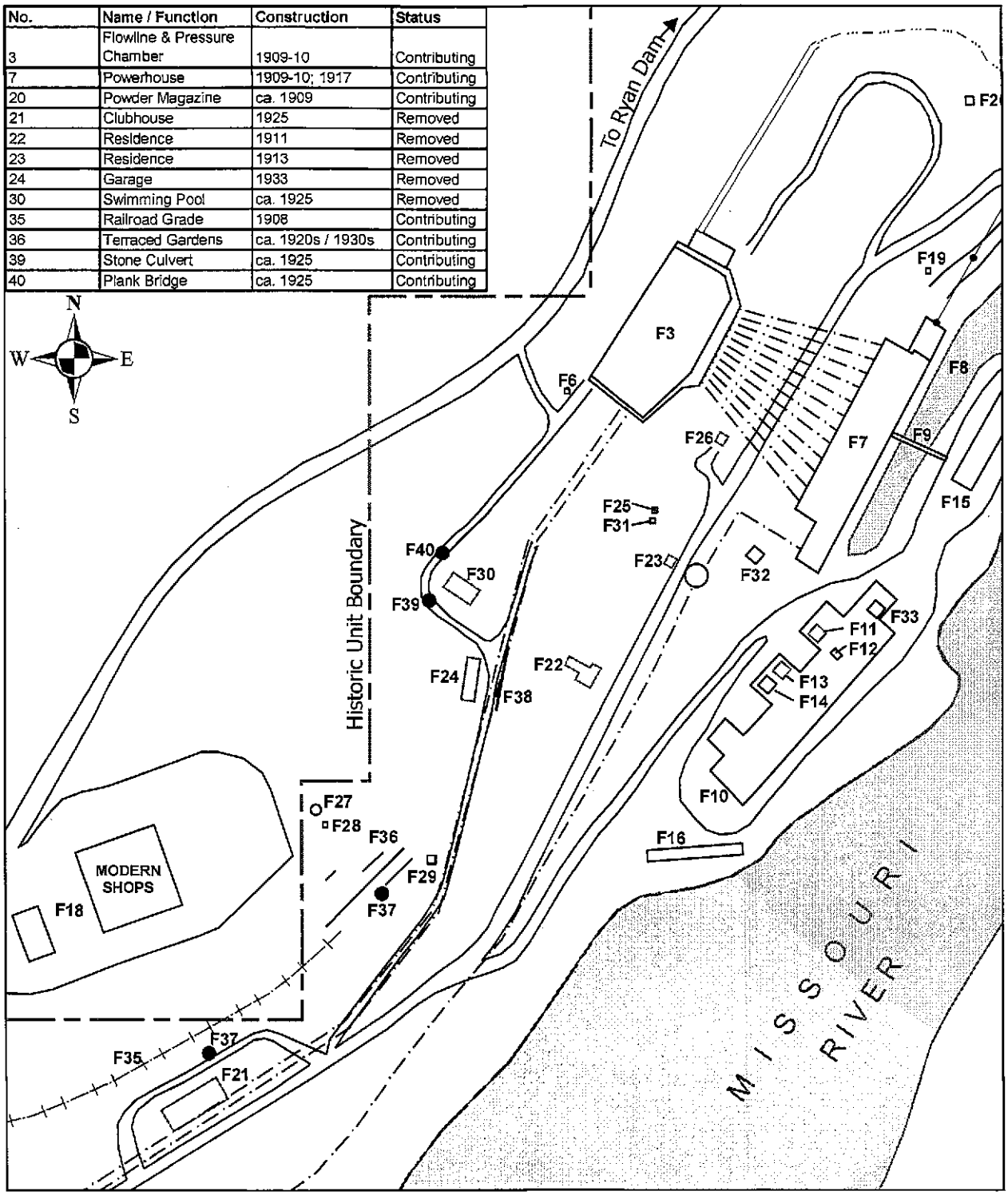

Figure 1. Map of Rainbow Hydroelectric Facility

comprised of a pair of wedge-shaped timbers which are positioned wide-end to wide-end in the form of a gable. Each of these supports a 3" plank and three 8" timbers, all set diagonally. A vertical plank centered on the gable end wall covers the ends of diagonal timbers and planks. Overall, the wooden front wall is 15'10" long at its widest and 8' tall at the peak of the gable. A few patches of cement mortar are evident at the interstices.

A replacement door is centered on the front wall. Mr. Periman may have installed it in place of the original door when he made the dugout a root cellar in the mid-1970s. The 3'6" wide by 4'10" tall door is made of boards veneered on the exterior by a thin sheet of plywood. Two metal strap hinges allow the door to swing out and open. They are on the door's left side, while a metal latch-type handle is on the right side of the door. The original door frame, made of 1 x 12" boards, remains intact. It has, however, been lined on the interior by 1½ x 3" boards, effectively creating a smaller frame for today's door.

Rock retaining walls line a 4'6" wide pathway at the front of the door. The southeast retaining wall is about 10" tall and 4' long, while the northwest one is about 6" taller and 6" longer. Each wall is made of dry-laid rock slabs.

Remnants of the desiccant system used to control humidity in the powder magazine are evident on the top of the dugout. These consist of two vertical pipe vents which protrude up from the dugout's interior and through the grassy mound. There they stand about 4' apart from each other and about 6' each from the back (southwest) side of the dugout's front wall. Each is enclosed in its own 9" long by 9" wide by 9" tall box casing made of boards. The metal louvered cap for one of the pipe vents lies to next to its box case, while the other cap is no longer around.

A small vestibule or entry hall is located just inside the dugout's front door (Figure 2). Its two side walls both taper so that the vestibule measures 3'6" wide at the door and 6' wide at the interior wall between it and the powder magazine proper. The distance between the doorway and the interior wall is 4' at center. Planks (2x10") line the tapered side walls as well as the ceiling. Flooring consists of an older but modern pad of poured concrete.

The interior of the powder magazine proper measures 14' long, about 8' wide overall, and about 6' tall. A line of five 8" timber posts stand in the front interior wall, or the 14' long wall at the vestibule. They are spaced about 2'6" apart from one post to the next. Doors (one each) are located in the two 2'6" wide openings between the three interior posts, providing access between the vestibule and one of the powder magazine's two interior rooms. These two doors are each 5'10" tall, paneled wood units.

The two-room powder magazine is of timber post-and-beam construction. Only the five posts in the front wall and three of the presumably five ceiling beams are visible, however. The two rooms are 7' long (southeast-northwest) each, but the southern room is slightly deeper (southwest-northeast) at 8'2", while the northern room is 7'9" wide. About the front half of the wall between the two rooms is a solid wall made of vertical ½ x 12" boards. The back half is open. Each room has a poured concrete floor and 2x8" planks on the ceiling and walls.

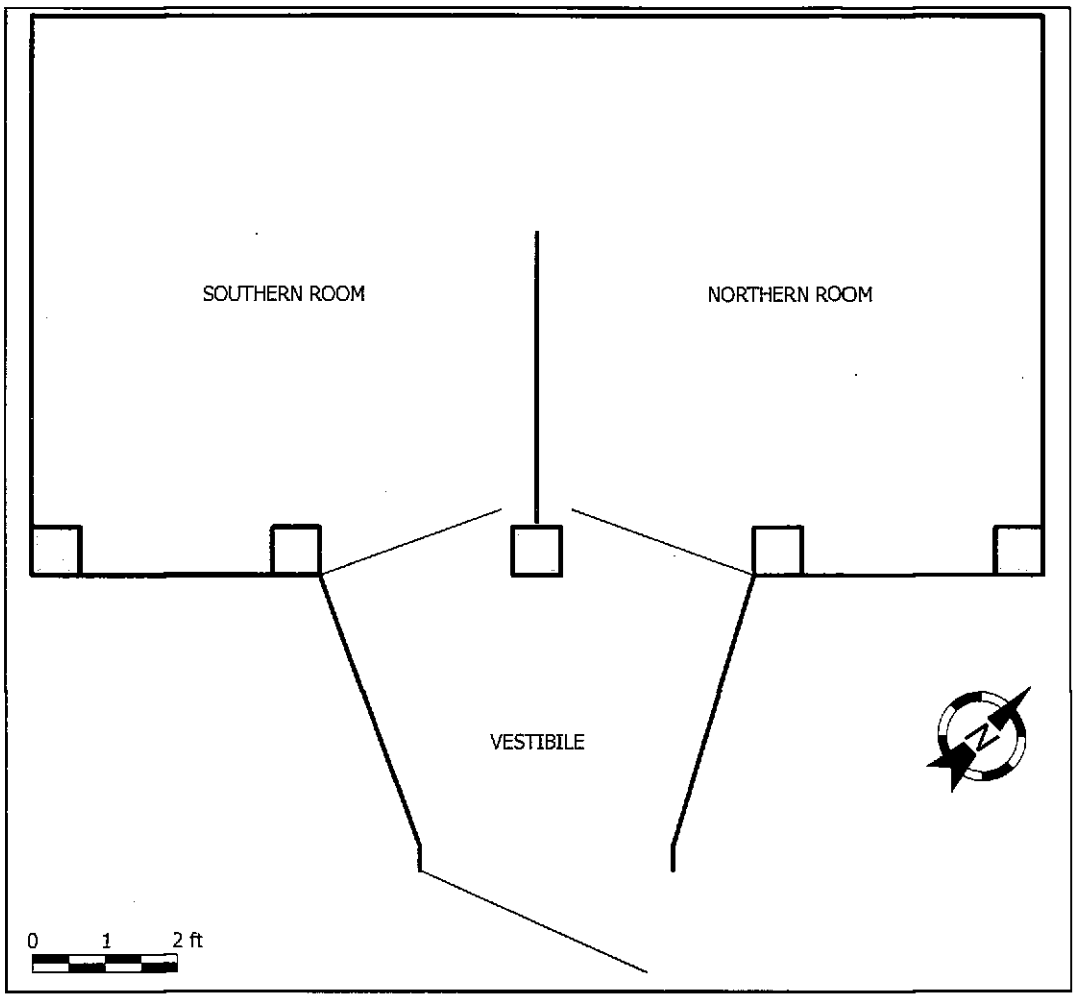

Figure 2. Plan of Powder Magazine.

The southern room has a single shelf lining its southwest wall. Installed by Periman in the mid-1970s, this shelf measures 2' wide, is made of 1½ x 6" boards, and has a single 3" post support at center. There are no other built-in features in either room.

Extending down through the ceiling of each room is one of the two pipe vents from the powder magazine's original desiccant or humidity control system. Wire-mesh screens cover the end of each pipe.

IV. FUTURE OF THE PROPERTY

PPL-Montana plans to remove the powder magazine at Rainbow. In order to address this impact, the company has sponsored recording the structure to HAER standards.

V. BIBLIOGRAPHY

O'Keefe, William. Telephone interviews with Fredric L. Quivik. 20 November 1987. 17 February 1988.

Rossillion, Mitzi. *Rainbow Redevelopment Powderhouse Archeological Testing, Cascade County, Montana.* Butte: Renewable Technologies, Inc., 2009.